1894

Bulletin of the State Experiment Station, Baton Rouge, LA. 1893.

William Carter Stubbs

SECOND SERIES,

No. 28.

BULLETIN

OF THE

STATE EXPERIMENT STATION,

BATON ROUGE, LA.

WM. C. STUBBS, PH. D., DIRECTOR.

1893.

1ST. REPORT OF THE FARM, D. N. BARROW, B. S., ASSISTANT DIRECTOR.
2ND. REPORT OF THE VETERINARIAN, S. B. STAPLES, D. V. S.
3RD REPORT OF THE ENTOMOLOGIST, H. A. MORGAN, B. S. A.

ISSUED BY THE BUREAU OF AGRICULTURE.
H. C. NEWSOM, COMMISSIONER.

BATON ROUGE, LA.
PRINTED AT THE TRUTH BOOK AND JOB OFFICE.
1894.

LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE.

BUREAU OF AGRICULTURE.

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LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE,
OFFICE OF EXPERIMENT STATIONS,
Baton Rouge, La.

Hon. H. C. Newsom, Commissioner of Agriculture, Baton Rouge, La.:

DEAR SIR—I hand you herewith reports from several departments of the State Experiment Station and ask that they be published as Bulletin No. 28.

Respectfully submitted,

WM. C. STUBBS,

Director.

PREFACE.

PART I.

Since our last report, some changes have occurred in the staff of this Station.

Prof. W. W. Clendenin has succeeded Prof. A. T. Prescott in charge of the botanical grounds. Aided by his sister, Miss Ida Clendenin, he proposes during this growing season to investigate some of the fungous diseases most destructive to the crops of the farm, garden and orchard.

These investigations, together with reports of similar studies elsewhere, will be published during the year in a special bulletin.

Strawberry Blight, the so called "Frog eye" on Tobacco, the Pear Blight on the Keiffer and Le Conte pears, and the diseases of sweet potatoes, of cotton and of sugar cane are some of the diseases that will be reported upon.

To the great regret of the farmers and planters of Louisiana, Dr. William H. Dalrymple, M. R. C. V. S., resigned last December to return to England. His place has been supplied with Dr. S. B. Staples, a graduate of this University, and subsequently a graduate of the Veterinary College of New York. A short report of his work is included in this bulletin. Special attention is called to the prevalence of glanders in some sections of the State and the necessity for prompt measures in eradicating it.

Prof. B. B. Ross, who has served the University, this Station and the State so well, has been called to do work in his native State. He now holds the responsible position of Professor of Chemistry in his "Alma Mater," the Agricultural and Mechanical College of Alabama, and State Chemist of Alabama.

His place has been supplied by Dr. Charles E. Coates, a Ph. D. graduate of Johns Hopkins University and a chemist of experience and ability.

These are the changes in the Station workers since our last report.

This bulletin contains—

1. The work of the farm for the past year by Assistant Director D. N. Barrow, aided by Farm Manager W. B. Mercier.

2. The report of the Veterinarian, Dr. S. B. Staples.

3. Report of the Entomologist, Prof. H. A. Morgan.

Special attention is called to the various formulæ given in the report of the Entomologist for treating our insect enemies, as well as a description of those of the latter which are now seriously threating us.

A special bulletin on Horticulture has recently been issued, giving the results of experiments with vegetables and fruits at all these Stations. This bulletin was mainly prepared by Mr. F. H. Burnette, Horticulturist of this Station.

The Central Louisiana Agricultural Society, which has its domicile at this Station, has recently held its monthly meetings at various localities in Central Louisiana. By this monthly change of places, a larger interest in agricultural affairs has been created. Mr. A. J. Loudon is President, and Prof. H. A. Morgan, Secretary.

REPORT OF FARM WORK.

PART II.

Dr. Wm. C. Stubbs, Director;

SIR—The work of the season has been along three main lines, *i. e.:*

1. What crops are adapted to this section.

2. What are the manurial requirements of this soil for different crops.

3. What are the best varieties of each species of plants.

It will be observed that most of the work is a repetition of former years.

One year's results are never conclusive, hence a repetition for several years of the same experiments become necessary in order to obtain fairly accurate data.

The season, as a whole, was not satisfactory. It opened up well, permitting a thorough preparation of land and satisfactory planting of crops, but was soon changed by excessive rains and these in turn by a prolonged drought, seriously reducing yields and vitiating the results of different fertilizers. It was ended with heavy showers at short intervals. The crops which had been forced into large growth by the use of fertilizers, struck the protracted drought just as they were fruiting, a critical period, requiring a large amount of moisture in the soil for maximum results, and hence suffered greatly, while those unfertilized grew slower, and weathering the drought, were in a condition to be greatly benefited by the subsequent showers. In July the effect of fertilizers was plainly visible to every beholder, while the October returns show but small differences.

Corn and cotton were the crops selected for extensive experimentation and four plats devoted to each.

CORN.

The first plat with this plant was devoted to varieties. At great cost of time and labor forty one varieties were secured and planted.

PREPARATION AND CULTIVATION.

Land broken with sulky plow; bedded and harrowed; corn planted April 3d; hilled April 10th; cultivated April 22d; thinned and stand obtained April 26th; cultivated April 28th, May 12th, and laid by June 8th. The cultivation used was Mallon's "Disc" or rotary hoe. The middles were split out on June 8th, with double mould board plow.

The seasons have been described and influenced the results according to the earliness or lateness of the variety.

The results are given in tabular form. The second column gives the pounds of corn in the shuck harvested, the third the bushels of shelled corn or grain; the fourth and fifth and sixth give respectively the percentages of shuck, cob and grain. The first column gives date of maturity. Rural Thoroughbred, Queen of the Prairie, King Philip, Sanford's, Long Yellow Flint, Early Yellow Canada, and Early Long White Flint are Northern varieties, the seed of which was introduced several years ago and since cultivated with a view of testing what acclimation would do for them in this Southern latitude. They have not proven beneficial and will be discarded. The Brazilian White Flour and Clarke's Flour are South American corns, which have been partially acclimated by several years of cultivation. They are soft white corns, excellent for bread, but very subject to attack of weevils. They are hardly worthy of cultivation. The Mexican June is a curiosity among corns. The stalks reached fifteen to twenty feet in height, but failed to make an ear, either here, at Audubon Park or Calhoun. The following are the results:

VARIETIES OF CORN.

Name.	When Ripe.	Yield per Acre. Corn in shuck, barrels.	Yield per Acre. Shelled corn in bushels.	Per cent. shuck.	Per cent. cob.	Per cent. grain.	Origin.
Mexican June	Never matured						Foreign
Brazilian Flour	Sept. 1	4,872	65.8	7.3	17.0	75.1	"
Clarke's Flour	Sept. 1	3,680	48.1	6.2	20.0	73.8	"
Early Yellow Canada	July 18	4,044	5 .5	10.0	20.0	70.0	Extreme Northern
Queen of the Prairie	"	3,1o5	4 .6	8.7	16.2	75.1	"
King Philip	"	1,340	15.5	23.7	22.5	59.8	"
Rural Thoroughbred	"	3,038	34.6	10.0	26.2	63.8	"
Sanford's	Sept. 1	1,770	18.9	20.0	20.0	60.0	"
Long Yellow Flint	July 18	1.973	22.1	12.5	25.0	62.5	"
Early Long White Flint	"	1.898	20.6	19.7	9.5	61.0	"
Hickory King	Sept. 1	3.902	57.8	6.	16.8	83.2	Western
Champion White Pearl	"	2 565	43.6	4.9	16.2	76.9	"
Mammoth White Surprise	"	4,836	62.4	8.8	18.9	72.3	"
Maryland White	"	3,528	50.3	5.0	15.1	79.9	"
Hendron's Bread	"	4,728	64.0	6.0	18.0	76.0	"
Ear y Mastodon	"	4.1 5	54.1	7.2	19.2	73.6	"
Mastodon Dent	"	4,680	61.4	6.0	20.4	73.6	"
Western	July 18	4,192	53.5	8.7	19.5	71.8	"
Kansas King	Sept. 1	4.575	61.6	5.0	20.1	74.9	"
Piaza King	"	4.220	58.5	7.7	17.0	75.3	"
Golden Dent	July 18	3,296	45.6	6.2	16.2	77.6	"
Golden Beauty	Sep . 1	3,471	46.0	8.6	16.0	74.4	"
Improved Leaming	July 18	5,868	68.6	12.3	22.2	65.5	"
Banks' Stock	Sept. 1	3.797	49.6	8.	12.6	73.3	"
Giant Broad Gram	"	4.081	50.3	9.8	20.9	69.3	"
New Madrid	July 18	3,534	47.3	7.8	7.1	75.1	"
McQuaide	Sept. 1	2.370	42.3	6.2	21.2	72.6	"
Patterson	"	3.374	43.0	10.0	17.5	72.5	Southern
Welborn's Conscience	"	4,302	53.0	6.7	22.4	70.9	"
Mosby's Prolific	"	5.206	74.3	6.1	13.7	80.2	"
Roberts	"	3.492	44.8	8.9	19.1	72.0	"
White Shoe-peg	"	4.032	51.5	7.4	20.9	71.6	"
Calhoun Red Cob	"	3.630	49.4	10.0	17.5	72.5	"
Riley	"	2.990	39.8	7.2	18.1	74.7	"
White St. Charles	"	4.443	60.0	7.5	18.7	75.8	"
Blount's Prolific	"	2,734	36.2	7.0	18.8	74.2	"
Creole	"	3 915	44.2	10.1	17.7	72.2	"

An examination of above will show a great difference in yield per acre, which was largely affected by the seasons, *e. g.* Improved Leaming. one of the earliest corns, gave 5,868 lbs. of corn in shuck per acre, the largest yield, while Mosby's Prolific,

one of the latest, gave the next highest yield 5,206, and largest yield of shelled corn. The earliness of the one met favorable showers in May and June, while the lateness of the other enabled it to withstand the drought of July and take advantage of excessive rains in August. Those varieties intermediate in time of ripening, encountered a drought at the critical period of earing and suffered. The percentage of grain is an important factor in corn raising, and every effort should be made to increase it without detriment to acre yields. The Hickory King comes with the largest percentage 83.2, followed next by Mosby's Prolific 80.2, and these by Maryland White, Champion White Pearl, Golden Dent, Hendron's Bread, White St. Charles, Peaza King and New Madrid. The rest of the corns gave less than 75 per cent of grain. How far the factor of grain is influenced by drouth must be determined through a series of years.

CORN.

EXPERIMENTS WITH FERTILIZERS.

Three plats were devoted to these experiments. One to nitrogenous, one to phosphatic and one to potassic manures. The same forms and tables reported last year were repeated. The questions propounded to these plats were: does this soil need either of the above ingredients to grow maximum quantities of corn, and if so, in what forms and quantities shall they be best applied?

Excellent stands were obtained and the plants grew off well, showing till June plainly the effects of nitrogenous and phosphatic manures. In July when those plants which had been forced into excessive growth by appropriate fertilizers, were just entering upon the tasselling and silking period a most disastrous drought ensued, which prevented full fruition. The unfertilized plants were much later and did not reach the critical period of tasselling until the drought was over. These climatic conditions produced the abnormal results of smaller stalks giving much larger ears than the larger and earlier ones. It was a curious spectacle to witness the harvesting of very large stalks with small ears, and small stalks with large ears. The actual

results obtained showed in several instances larger yields on the unmanured plats than were obtained from those fertilized with the best known combinations.

The comparative yields are not given, since they would be entirely misleading. Suffice to say, that up to the drought the mixtures of nitrogenous and soluble phosphatic manures gave largely increased growths.

COTTON.

VARIETIES.

The following varieties of cotton were grown upon equal areas and upon land of as nearly uniform character as could possibly be obtained. They were cultivated alike and ginned simultaneously on the Station's gin, after all had been harvested.

The following table gives the results, with percentages of each picking, lint and seed. It will be observed that a great difference exists between the yields of different cottons as well as in the percentages of lint given. The Hawkins cotton gave the largest yield on this Station and at Audubon Park. At present long staple cottons are but very slightly more valuable in our markets than the short lint varities. It would, therefore, seem to be the policy of the farmer just now to grow that variety which will give him the largest amount of lint per acre.

PLAT 6.—VARIETIES OF COTTON.

NAME.	YIELD PER ACRE, SEED COTTON.				Per cent. seed.	Per cent lint.	Total lint.
	Per cent. 1st picking.	Per cent. 2nd picking.	Per cent. 3rd picking.	Total.			
Gunn	52	39	9	1065.3	64	36	355.1
Cochran's Short Limbed Prolific	64	29	7	890.4	71	29	258
Allen's Silk	39	52	9	1281.4	75	25	320.3
Drake's Cluster	37	50	13	1435.8	73	27	396.5
Smith's Standard	76	21	3	810.2	67	33	267
Dixon's Improved	40	42	18	1096.2	70	30	327
Ben Smith	66	28	16	809.7	71	29	234
Kelly	59	33	8	1160.7	68	32	371
Southern Hope	38	42	19	1780.8	69	31	551
Hawkin's Improved	36	45	19	2014	64	36	732
Bancroft's Herlong	32	58	10	1102.4	70	30	330
Welborn's Pet	53	37	10	1017.6	70	30	303
Extra Early Carolina	75	25	....	1022.9	70	30	306
Truitt's Improved	43	37	20	1356.8	64	36	487
Coltharp's Eureka	39	48	13	1234.9	73	27	332
Cook's Long Staple	43	34	23	1701.3	72	28	476
Texas Storm and Drought Proof	27	44	29	1446.9	65	35	504
Brooks' Improved	49	49	2	959.3	67	33	315
Brannon	36	36	28	1314.4	67	33	432
Matthews' Long Staple	45	44	11	1070.6	72	28	299
Peerless	58	36	6	1065.3	69	31	328
Tennessee Gold Dust	52	31	17	1505.2	69	31	465
Bolivar County	54	40	6	954.0	63	37	351
Fishburn	37	44	19	1155.4	70	30	345
Peterkin New Cluster	34	40	26	1702.0	68	32	544
Foster	17	33	60	514.9	75	24	128
Haggaman	34	47	19	1266.7	70	30	378
Pettit Gulf	53	32	15	1494.6	73	27	402
King's Improved	61	35	4	710.2	69	31	220
Willis	50	37	13	1007.0	70	30	300
Smith's Premium	63	34	3	798.5	68	32	254
Marston	44	26	30	1738.4	70	30	519
Kolb's Improved Prolific	70	21	9	1007.0	65	35	350
Boyd's Prolific	37	54	9	866.9	64	36	309
Peterkin's Improved	32	35	23	1298.5	70	30	387
Okra	86	13	1	959.3	69	31	294
Hunnicutt	47	23	30	1685.4	68	32	537
Mexican	55	33	12	1435.5	74	26	367
Roe's Early	63	25	12	1430.0	71	29	414
Allen's Acme	23	13	64	960	76	24	230
Excelsior	75	17	8	1464.2	65	35	518

COTTON.

EXPERIMENTS WITH FERTILIZERS.

These were carried on in a similar manner to those described under corn. The same climatic conditions prevailed to render results unsatisfactory and misleading. The immense crop of squares and bolls superinduced by favorable seasons, with suitable fertilizers, was suddenly checked and dropped by the drought of July—absolutely vitiating results. Hence comparative yields are not given.

What distance shall the rows of cotton be and what distance in the row shall the plants stand? are questions dependant largely upon soils, seasons and varieties. The short limb and cluster cottons will stand closer planting than the long limb varieties. All kinds can be grown more thickly on poor soils than on fertile ones. Distance may then be pronounced, a variety dependent upon soils, seasons, fertilizers applied, etc.

The experiment given below was made to test the question of distance upon our unaided soils. Rows three, four and five feet wide were used and stalks (one or two) left at distances from one to two feet in the row. The land used had been for four years in corn without fertilizers, and was therefore not in excellent heart. The season, as before mentioned, was very variable and entirely unsuited to maximum cotton yields, therefore the results reported are simply suggestive and by no means conclusive. The following table gives the results. In it are given also the aggregate results for the three, four and five-foot rows. It may be noted that the aggregate of the three-foot rows is greater than either of the others.

COTTON.—EXPERIMENTS IN WIDTH OF ROWS AND DISTANCE.

Width of Row.	Distance in row.	No. of stalks in hill.	Seed Cotton Per Acre.			
			First picking, per cent.	Second picking, per cent.	Third picking, per cent.	Total pounds.
3 feet	1 foot	one	54	36	10	1726
3 feet	1 foot	two	46	42	12	1584
3 feet	1½ feet	one	52	33	15	2037
3 feet	1½ feet	two	60	31	9	1565
3 feet	2 feet	one	62	30	8	1811
3 feet	2 feet	two	55	30	15	2207
Aggregate 3 feet						1821
4 feet	1 foot	one	62	30	8	1715
4 feet	1 foot	two	65	28	7	1602
4 feet	1½ feet	one	66	26	8	1734
4 feet	1½ feet	two	67	26	7	1734
4 feet	2 feet	one	58	31	11	1432
4 feet	2 feet	two	58	32	10	1617
Aggregate 4 feet						1557
5 feet	1 foot	one	61	33	6	1624
5 feet	1 foot	two	54	38	8	1394
5 feet	1½ feet	one	62	29	9	1572
5 feet	1½ feet	two	61	32	7	1512
5 feet	2 feet	one	51	43	6	1428
5 feet	2 feet	two	53	39	8	1610
Aggregate 5 feet						1540

ROTATION OF CROPS.

Six acres have been used for six years to test the question of properly building up the fertility of our soil by a systematic rotation of crops. Corn and peas, oats and peas, and cotton have been the crops selected, growing the five crops in three years. These crops have been grown in duplicate, fertilized and unfertilized, testing rotation with and without fertilizers. It has been difficult to select six acres of equal fertility to begin with. Again, physical properties, particularly drainage are rarely alike in contiguous acres. Our fertilized acres were selected to the north and unfertilized to south. After selection it was found that the unfertilized ones had a gentle slope to the surrounding

bayou, which facilitated drainage; the fertilized acres were nearly on a level. The cotton crop fertilized has uniformly given higher yields than the unfertilized, while corn, oats and peas have not; showing the detrimental influence of excessive moisture upon these crops. Doubtless the cotton crop would have been also greatly enhanced with better drainage, but growing throughout the summer, the want of drainage effected it less than the other crops. Cow peas are known to be very sensitive to excessive moisture in the soil and the want of growth of this crop may in part account for deficiency of corn and oats.

However, these acres have now been thoroughly drained and hopes are entertained of conclusive results in the near future.

FORAGE PLANTS.

With the new industry springing up in our midst of fattening cattle for market, the growing of some cheap good forage on the farm that, by supplementing with some concentrated food, can be used for this purpose, becomes of very great importance. In order to determine the crops best adapted to this purpose ten varieties of the non saccharine and saccharine sorghums were planted. The yields of green forage are given in the following table:

It may not be amiss to state before closing this report that the Station is now busily engaged in careful "cattle feeding."

It is testing the practicability of preparing our scrub cattle for market, by feeding them upon our home products, viz: Cotton seed meal and hulls, molasses, rice bran and straw, etc.

It has just finished its first trial upon six native steers, using cotton seed meal and hulls, moistened with cheap molasses, as the only food. It has began a second trial, using rice bran and straw.

It is to be regretted that the low prices, now prevailing, will deter many from entering upon this enterprise, however successful the trials now on hand.

A special bulletin, covering full results of this work, will be given to the public upon the completion of this work.

Name.	Yield per acre in Pounds.
Egyptian Wheat	24 487
Kansas Orange Sorghum	34,314
Pearl Millet	17,046
Jerusalem Corn	15,250
Teosinte	11,718
Red Kaffir Corn	15,654
White Kaffir Corn	15,580
Large African Millet	12,300
Yellow Millo Maize	17,210
White Millo Maize	15,280

In the above table Egyptian Wheat and Kansas Orange Sorghum have given the largest yields by virtue of the superior land which they occupied; had the others been on similar soils the yields would have been larger. The Saccharine Sorghums are particularly palatable to stock, and if the early varieties be used will give two and possibly three cuttings per year. Some of the above are particularly valuable for their seeds, but in the vicinity of cities, where the English sparrow abounds, few if any seed are gathered.

SPANISH PEANUTS.

A special favorite with the small farmers of North Louisiana, where the vines, with the adherent pods are cured easily into hay, have been tried to a limited extent. In a light loamy or sandy soil the above practice is easily executed, the light soil permitting the easy removal of vines and pods by pulling with the hands or prizing with the fork. This plant is very valuable as a food, and is one of the best renovators of soils known. Several thousand acres are now grown in the hill section of this State, and with a strong tendency to a larger increase in acreage annually. In heavy loams or clay soils the pods are not easily removed with the vines; at least 50 per cent. are ruptured and left in the ground. Exclusive of the quantity left in the earth our yield was at the rate of 4,422 pounds of fresh nuts per acre. Those left in the ground could easily be removed by hogs, and the latter be greatly benefited by the act. This plant is worthy

of very extended cultivation, either as a general forage crop, a hog crop or a renovator of the soil.

The large White and Virginia peanuts were also grown with excellent results.

The African ground pea, another crop specially adapted to the hog, has heretofore resisted our efforts to successfully grow it. This year each plant reproduced seed one hundred fold.

The Chufa completes our list of hog crops. It thrives well on our soils and wherever hogs are grown should have a small area devoted to it.

GRASSES AND CLOVER.

With our luxuriant natives there is not much need of a summer grass here, but there is a place for a good winter grass, and the Station has been directing its efforts towards determining those that will fill this want. The ideal grass for this purpose is one that shall renew itself each fall, giving good pasturage during winter, making way in the spring for the natives, again reappearing of its own accord when they disappear in the fall. Most any of the tame grasses fulfill the first requirement, but only a very few are able to stand the test of summer. First of these may be mentioned the

TEXAS BLUE GRASS,

A near relative of the celebrated Kentucky Blue. It is somewhat coarser and not quite so nutritious, but still is a very good food. On good land when unpastured it will grow knee high. A bed of it put out five years ago is only now beginning to give way after a constant occupation of the land during winter, shared with the Paspalums and Bermuda during summer. The next plant to promise success is

ALFALFA.

This being a legume will not thrive unless the soil is charged with its special nitrogen collecting ferment. Acting on this knowledge we have sown the same land persistently with this seed each fall for three years. At first only a few plants survived the summer, but our perseverance has at last been reward-

ed by an excellent stand with good growth appearance. Besides beirg a soil renovator, when once established it makes one of the finest and most easily cured hays we have ever handled.

BURR CLOVER,

While not so valuable on account of its tendency to woodiness as some of the other trifoliata, commends itself to us on account of the facility with which it reseeds itself each year.

RED CLOVER

Has not been so successful. Good stands are easily obtained, giving a heavy cutting in the spring, but it is completely chased out during the summer and fails to reappear the following fall in sufficient quantity to make it remunerative.

CRIMSON CLOVER

Does fairly well, but is an amiable subject to the same objections as the above.

OTHER GRASSES

Tried without any or only partial success are, Red Top (Agrostis Vulgaris), Orchard (Dactylis glomerata), Kentucky Blue (Poa-pratensis), Tall Meadow Oat (Arrenatheum avenaceum), Italian Rye (Lolum Italicum), Meadow Fescue (Festuca Elatiar), etc.

PEAS.

In order to test their relative merits, both for food and a green manuring, the following varieties of cow peas or, more properly speaking, beans, were planted.

The fruit was gathered as soon as mature, and the vines then cut and cured into hay. The following table gives the results:

YIELD OF PEAS PER ACRE.

Name.	When gathered.	Pounds peas in pod.	Cut.	Pounds of hay.
Iron	July 8	302	July 13	7,020
Purple Hull	July 1	....	July 25	3,510
White Black Eye	July 12	97	July 25	5,070
Regular Lady	July 8	300	July 13	4,680
Blue	June 24	819	July 13	3,510
Whippoorwill	July 8	507	July 13	5,850
Sugar Crowder	July 13	105	July 25	3,510
Red Ripper	July 8	268	July 13	2,535
Indian Red	....	....	July 25	2,730
Black King	July 8	756	July 13	2,145
Speckled	July 8	721	July 13	2,925
Large White	June 10	273	July 13	1,365

MISCELLANEOUS CROPS.

On May 12 a number of tobacco plants of the following named varieties were received from the North Louisiana Station, and set out. (For remarks on their success see Tobacco Bulletin No. 25.)

Cigar Varieties.	Bright Leaf Varieties.
Choice Havana.	Imported White Burley.
Connecticut Seed Leaf.	Conqueror.
Pennsylvania Seed Leaf.	Premium.
Havana Seed Leaf.	Sweet Orinoco.
Little Dutch.	Famous.
Improved Havana. (From R. Frotscher.)	Ragsland's Improved.
Comstock Spanish.	Hyco.
Connecticut Seed Leaf. (From R. Frotscher.)	Flanagan.
	Yellow Orinoco.

In April small plats of Japanese and Silver hulled buckwheat were planted. They were gathered June 25, just sixty days after. The Silver hulled only yielded seventy five pounds of grain per acre, while the Japanese did fairly well, giving 720 pounds or seventeen bushels per acre.

SUGAR CANE.

A one-horse horse mill was purchased during the fall and all the varieties of cane carefully ground in order to get fair samples of juice analysis. The following are the results:

ANALYSES OF CANE.

NAME.	Age.	T. S.	Per Cent Sucrose.	Per Cent Glucose	P. C.
Mexican Striped	plant	14.1	10.8	2.32	77
Mexican Striped	1st yrs stubble.	15.4	12.6	2.17	81
Black Java	plant.	14.7	10.7	2.41	72
Black Java	1st yrs stubble.	17.6	15.2	1.55	86
Black Java	2d yrs stubble.	16.6	14.5	1.19	87
Kainio	3rd yrs stubble.	12.6	6.2	5.5	48
Green	1st yrs stubble.	14.3	10.0	3.78	69
Ainakea	1st yrs stubble.	12.9	7.6	4.27	58
Yellow	1st yrs stubble.	14.7	10.5	3.09	71
Kokea	1st yrs stubble.	16.3	13.5	1.94	82
Papaa	1st yrs stubble.	12.0	6.5	4.56	54
Rose Bamboo	1st yrs stubble.	13.6	9.5	2.82	71
Rose Bamboo	2d yrs stubble.	13.1	9.3	2.94	70
Crystallina	1st yrs stubble.	15.6	12.0	2.54	76
Akilolo, L. S.	2d yrs stubble.	12.9	8.0	3.78	62
Ohia	2d yrs stubble.	12.9	7.8	2.94	60
Honuola	2d yrs stubble.	12.5	7.6	3.52	60
Pupuha	3rd yrs stubble.	17.0	14.1	1.44	83
Japanese	3rd yrs stubble.	16.0	11.8	3.52	74

LIVE STOCK.

The station continues its stock of Holstein and Jersey cattle, both of which continue to do well here. There are now on hand two Holstein bull calves for sale, one eighteen and the other six months old. Both are fine specimens and are entitled to registration.

POULTRY.

With only a pair or two of the different breeds, and these confined in small pens, it is impossible to make an accurate test of the merits of the different varieties. The following is the egg record of the different breeds under confinement:

EGG RECORD OF POULTRY FOR 85 DAYS, ENDING MAY 12, 1893.

Breed.	No. Hens.	Total Eggs.	Average Per Hen and Day.	Remarks.
Barred Plymouth Rock	1	40	.4	
White Plymouth Rock	1	21	.21	
Brown Leghorn	2	77	.38	
Buff Cochin	3	50	.16	
Partridge Cochin	1	16	.16	Hen died April 6th.
Light Brahma	1	31	.31	
Langshan	2	49	.29	
Laced Wyandotte	1	20	.20	
Black Minorca	2	51	.25	

Under the restraint of the small pens the Plymouth Rock has excelled in egg production, but has shown some symptom of invalidism. In order to test their adaptation to early broilers the chicks of each breed were carefully weighed at the age of three months, with following results:

WEIGHTS OF BREEDS OF CHICKENS.

Breed.	Males			Females.			Total Weight.
	Number.	Weight.	Average Weight.	Number.	Weight.	Average Weight.	
Light Brahma	2	3 lb. 10 oz.	1 lb. 15 oz.	2	3 lb. 1 oz.	1 lb. 8 oz.	1 lb. 13 oz.
Buff Cochins	2	3 lb. 2 oz.	1 lb. 9 oz.	1	1 lb. 10 oz.	1 lb. 10 oz	1 lb. 9½ oz.
Partridge Cochin	4	6 lb. 8 oz.	1 lb. 10 oz.	2	3 lb 10 oz.	1 lb. 13 oz.	1 lb. 11 oz.
Brown Leghorn	..	.....	.....	3	3 lb. 12 oz.	1 lb. 4 oz.	1 lb. 4 oz.
Langshan	..	.....	.....	6	7 lb. 11 oz.	1 lb. 14 oz.	1 lb. 14 oz.
Indian Game	..	.....	.....	2	2 lb. 15 oz.	1 lb. 7 oz.	1 lb. 7 oz.
Dung Hill	6	8 lb. 6 oz.	1 lb. 6 oz.	6	8 lb.	1 lb. 5 oz.	1 lb. 5½ oz.
Black Minorcas	1	1 lb. 9 oz.	1 lb. 9 oz.	2	2 lb. 4 oz.	1 lb. 2 oz.	1 lb. 5 oz.
Laced Wyandotte	2	3 lb. 10 oz.	1 lb. 13 oz.	1	1 lb. 9 oz.	1 lb. 9 oz.	1 lb. 11 oz.

The Langshan leads in weight, followed by the Partridge Cochin and Laced Wyandotte. Either of the last would prove preferable to the farmer on account of its black feathered legs. Feathers on the legs would also an be objection to the Partridge Cochin.

Respectfully submitted,

D. N. BARROW, Assistant Director.

REPORT OF VETERINARIAN.

PART III.

Dr. Wm. C. Stubbs, Director:

SIR—Since the assumption of the duties of this office in December last, there is but little to report of a public character.

The station wishes to call the attention of the farmers and planters of the State to the objects and purposes of this department, which are:

1. To furnish information whereby diseases and injuries to our domestic animals, "nature's dumb nobility," may be intelligently and humanely treated with a view of permanent cure or an alleviation of suffering, and

2. To aid in dissemination of information relative first, to the laws of health, a knowledge of which will frequently prevent diseases, and second, to laws of breeding, by which improved stock of every character can be obtained.

To accomplish these objects the following means have been adopted:

1. The establishment of an infirmary upon the grounds of the station where diseased or injured animals will be treated daily at stated hours. These free clinics afford, at the same time, opportunities for the agricultural students of the State University and Agricultural and Mechanical College to become thoroughly acquainted with the common diseases of our stock. If the patients demand constant care and attention they are placed in the hospital and kept until restoration is accomplished, hope of curing abandoned, or death ensues. No charge is made save for drugs, feed and attention of hostler.

2. Correspondence.—All answers to letters of inquiry relative to stock and their diseases from any part of the State, will be promptly made, and the farmers and planters of the State are earnestly invited to avail themselves of this privilege.

3. Publications in the Reports of the Bureau of Agriculture and Bulletins of the Experiment Stations.

4. Personal visits, which are made at the request of the police jury of a parish, or the owners of stock which are supposed to be suffering from an infectious or contagious disease. In either event the actual expenses incurred in the visit are exacted, no charge being made for professional services.

Many parishes and several owners have been thus successfully served and it is earnestly desired that such calls be made when needed, as speedily as possible, since the prime object of this department is the eradication of infectious and contagious diseases.

WORK OF THE DEPARTMENT.

The following, taken from our clinics, is decreed worthy of recital:

FISTULÆ.

An animal was brought to the Hospital suffering from a fistula of the withers. It had been opened on left side by someone, who had also cut off three joints of the horse's tail (as a cure) and some other humanely inclined person had cut three tendons in each one of his ears and split his upper lip between the nostrils for about four inches.

The affection was of three months' standing, and had become chronic. After two months' treatment the animal was discharged as cured, without a blemish, excepting a small hump and a very small scar where the necessary opening had been made. No surgical methods were employed, as we used only medicinal agents. The agents which effected a cure, in three weeks, were Villates' solution (composition below) used as an injection twice a day, every other day, and Potassium Iodide half drachm doses, administered internally twice every day. Care has to be taken in giving the Potassium Iodide, and frequent stops must be made

in its administration or the animal becomes affected with Iodism.

The following is Villates' Solution: Liquor Sub Acetate Lead, one ounce; Copper Sulphate, Zinc Sulphate, each half ounce; dilute Acetic Acid, eight ounces. Mix the Acetic Acid and Copper Sulphate and then add others.

In the first injections the solution should be used in full strength, but as the animal begins to show sensibility to its effects, dilute it a little. Plug up the openings made for free drainage and allow the caustic to remain in the fistula for about a minute, then permit it to escape, washing off the parts outside. Use a small thumb syringe holding about four drachms.

Patassium Iodide may be given in the water or, by the syringe, into the mouth, in drachm doses twice a day.

GLANDERS.

In October, 1893, at the request of the Police Jury of Avoyelles parish, we went to Marksville and gave our opinion in a suit there before the court, in which parties were claiming damages for eight mules and horses lost from what was believed to have been glanders, brought to plaintiff's plantation by a mule bought from defendant in March, 1893.

It was shown in the evidence that the mule in question, previous to leaving defendant's place, had been attacked with distemper, and was just recovering when sold, and that several hours after the transfer the mule commenced to run at the nose a bloody, oily discharge.

In ten days the symptoms of glanders became more pronounced; the discharge increased, the hind legs swelled, farcy heads made their appearance along the neck and ulcers broke out there and on hind legs, especially the left one. By this time the disease had attacked several others in the acute form, and in a few months killed seven of them and one horse, which was the last taken with the disease.

The point of interest in this case lies in the fact, as established by witnesses, that the mule sold had been suffering from strangles or distemper previous to sale, had become very much emaciated, and, after recovery from the strangles showed symp-

toms of and developed an acute case of glanders, thus making it plainly evident—for no other glandered stock were around—that the disease had been latent in his system; how long. it is impossible to tell, and was forced to show itself by the debilitated condition of the animal.

These circumstances go to accentuate the long known and well established fact that a mule or horse can have this dread disease lurking in his system for years in a latent condition, waiting only for hard usage, exposure, or a broken down debilitated condition, brought about by other maladies, to make its appearance in full force. Acting on our advice, the lots and all other objects subjected to contact were thoroughly disenfected with lime and corrosive sublimate solution.

IMPACTION OF STOMACH.

In early January a request was received to visit Gayden. just above Baton Rouge, and detect, if possible, the cause of a fatal disease among dairy cows. Answering the request, it was found that the animals—three in number—which had died showed symptoms of high fever, loss of appetite, great thirst, with labored breathing, and without action of the bowels noticed for some hours. Mr. Gayden had held a post mortem examination on one of the cows, and found the manifolds impacted with a hard, dry mass, and the membrane and the abdominal membranes adjoining it "red and highly inflamed." Looking after the feed, which was cotton seed meal and hulls, it was found that in it lay the trouble, for the proportions were not correct.

A change of food was advised, and as a precaution a purgative was given to all the cattle.

No more trouble has been reported from that cause among these stock.

On February 5 a similar call came from Natchitoches to visit the plantation of Mr. J. Dixon and investigate a "fatal disease" from which eight or nine head of milch cows had died. Examining the one cow then affected and gathering the symp-

toms exhibited by the others which had died, it was found that these, too, were cases of impaction due to their feed of cotton-seed meal and hulls in wrong proportions. One cow of those affected had been saved by the owner giving her a heroic dose of purgative—the only animal he succeeded in getting an action from.

Change of food was advised, and since then no further trouble has been reported among the cattle.

Respectfully submitted,

S B. STAPLES, Veterinarian.

REPORT OF ENTOMOLOGIST.

PART IV.

Dr. Wm. C. Stubbs, Director:

SIR—The work of this department has consisted in replying to the many inquiries concerning pests of the farm, garden, orchard and vineyard, in the breeding and identifying of specimens sent to this department, together with those collected here and elsewhere throughout the State, and in the study of such insect attacks as were threatening to a community or to the State, thus requiring immediate investigation at those points where the outbreaks occurred or where the damage was most seriously felt.

The correspondence has been much in excess of former years. It has principally been concerning the commoner pests of crops, and general recommendations have been made in connection with those insecticides commonly used for sucking and biting insects, and which we have found of sufficient merit to urge their application. These recommendations have been given to the public in detail by means of bulletins, reports, etc., published by this department. It may, however, be well to repeat here these recommendations for the ready guidance of our readers in the future:

BITING (MANDIBULATE) INSECTS.

As examples of such we have the common leaf eating insects of our orchards and garden for which we recommend the following:

1. The use of Paris green either in solution or mixed with gypsum, flour or air slaked lime. In solution ¼ pound per 50 gallons of water will be found of standard strength, yet the

leaves of the peach are often burnt by the application of this strength and hence a solution not stronger than ¼ pound to 125 gallons of water should be used upon the peach; unless ¼ pound of lime for every 50 gallons of the solution be added, in such cases the action (burning) of the Paris green is so modified that double its quantity may be used with safety. To apply this solution the ordinary knapsack sprayer (Fig. 1) may be used upon small trees and bushes, while the spray pump (barrel attachment) as seen at Fig. 2 should be used in its application to larger trees.

Fig. 1.

Paris green as a powder mixed with any of the substances above named, may be applied ordinarily by means of an old tin can with small holes perforated in the bottom, using a strength of one part of Paris green to 50 parts of lime, gypsum or flour. For use upon cabbages and such plants, of which the leaves are used for food, one part of Paris green to 100 parts of lime, gypsum or flour well dusted upon the parts attacked (outer leaves of cabbages) will be found an excellent remedy.

London purple is used similarly to Paris green, but being more soluble in water should be applied with greater care to plants liable to burning by the ordinary use of arsenites.

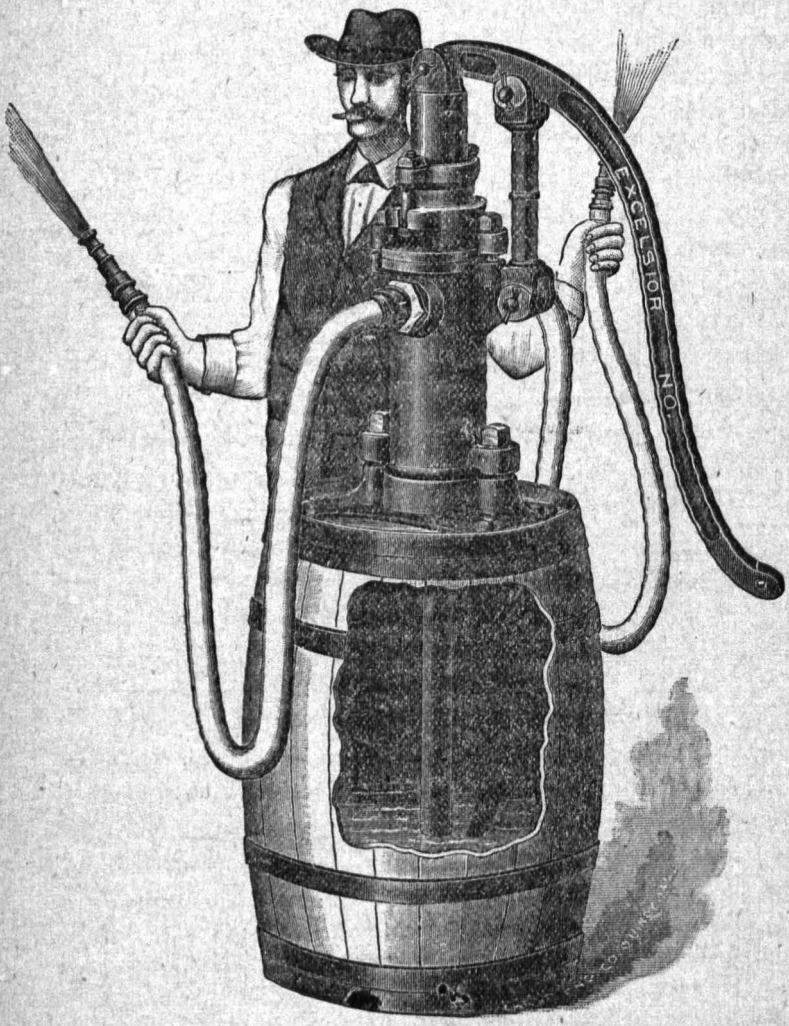

Fig. 2.

SUCKING (HUSTELLATE) INSECTS.

As examples of these we have the common plant lice (aphides) and scale insects (orange). These plant enemies obtain

their food below the surface and hence must be treated by solution that will kill by contact.

1. *Kerosene Emulsion* (Riley).—In 1 gallon of water dissolve by boiling ½ pound of common soap, after which remove from the fire and add 2 gallons of coal oil; thoroughly churn (for five minutes) until the whole is milk-like, then take 1 part of the solution thus prepared and dilute it with 10 to 12 parts of water. The use of soft water is preferred in making this emulsion. Do not dilute any more than will be used at one time. The undiluted emulsion will assume a jelly like condition when cold and may be kept for a long time in a cool place. When required for use heat the prescribed amount with about ⅓ of the water to be used in dilution, churn and add the remainder. See that the emulsion is a perfect one, and then apply with a spray pump.

2. *Rosin Emulsion.*—In 20 gallons of water boil slowly for 3 hours, 20 pounds of rosin, 6 pounds of caustic soda (70 per cent.) and 3 pounds of fish oil; then add 30 gallons of warm water (stirring well while adding), and dilute the whole with 50 gallons of cold water. For deciduous trees, to be applied during the winter, the following is recommended: 30 pounds of rosin, 9 pounds of caustic soda* (70 per cent.) and 4½ pounds of fish oil. This is prepared in the same manner and diluted to the same extent, and will give better results than the weaker one. Apply with a spray pump, using a fine nozzle (Vermorel).

Both Kerosene and Rosin emulsions destroy biting insects as well as suctorial, but of course the results are not so lasting since they only kill by contact and hence the application must be made directly to the body of the insect. Heavy grains will influence the results of any insecticide, particularly the application of emulsions to scale insects. Should a heavy rain fall within forty-eight hours after an application, a second one should soon follow.

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*A more convenient form of caustic soda is the powdered form (98 per cent.) which may be procured from A. Vizard, Magazine street, New Orleans, La., in 10-pound cans, at 10 cents per pound.

FOR FLIES AND GNATS.

1. *Fish Oil Emulsion.*—Prepared in the same way as the Kerosene emulsion, substituting fish oil for the coal oil, and diluting one part of the emulsion with five parts of water. This emulsion sprayed upon fattening, milk, or work stock will be found an excellent means of protecting stock from the unmerciful attacks of buffalo gnats, horn flies, etc.

Other remedies which may be considered general will be given in connection with remarks upon certain species.

REMARKS ON INSECTS PREVIOUSLY CONSIDERED BY THIS DEPARTMENT.

SUGAR CANE BORER (*Chilo saccharalis*). See Bulletin No. 9, Second Series.

Reports from the sugar cane districts of the State indicate that the ravages of this insect are increasing. For the last two seasons the borer has been found further north than at any previous time, reaching last year the crops on the bluff lands near Baton Rouge. In Ascension Parish, near McCall Post-office, it has done considerable damage. Planters have, very generally, burnt the cane trash, and yet the attack has apparently not been lessened. Search has been made for food plants other than sugar cane, and they have been found in both "Guinea Corn" (Sorghum vulgare) and "Johnson Grass" (Sorghum halepense.) During the month of December specimens of this pest were found on both plants, in the larval condition. Mr. G. Brulay, of Brownsville, Texas, who has been for some years studying this pest, writes me that the moths appeared about the middle of April by the hundreds about the lamps of his study. I received specimens of moths from Mr. Brulay on April 25, 1892. In the bottom of the small box in which they were sent were found hundreds of eggs which had been deposited during the journey. I succeeded in raising the borers nearly to maturity on stalks of corn. By mistake the corn was given too strong an application of nitrate of soda, which resulted in the killing of the plants; the borers, however, were in a perfectly healthy condition at this time. From the

fact that the sugar cane borer is partial to Sorghum saccharatum (cultivated species), and that it has been found upon the two species of sorghum which have become common weeds in many of the sugar cane growing regions, may these facts not account for its presence in such numbers, early in the season (long before it could have completed a cycle in the cane), in spite of the complete destruction of the cane tops of the previous season by burning?

I desire to call the attention of the sugar planters to these food plants of our common sugar cane pest, and it may be that by the cutting down and burning of these plants, growing perhaps upon waste places near the plantation, that the attack of the borer will be lessened.

From notes upon moths kept in breeding cages, I find that one moth will deposit over one hundred eggs.

SCREW WORM FLY (*Lucilia macellaria*). See Bulletin No. 2, Second Series.

Since the publication of the Bulletin in 1890, no opportunity has been afforded for the further study of this insect. During 1891 and 1892, no attacks were reported. In November, 1893, a single severe attack was called to my attention in Central Louisiana.

INSECTS INJURIOUS TO STORED GRAIN.—See Crop Report, October, 1893. From the above report we quote the following:

"The problem of protecting stored grain, particularly corn, from the unmerciful attack of insects and mice is each year becoming of greater significance. This year is not without its increased numbers of insects, and especially the weevil. The present alarming attack of the Corn weevil in many sections was indicated early in the season, long before the corn had reached maturity. As early as the last of May and the beginning of June the Corn weevil was found abundantly, burrowing into ripening peaches. From that time on their presence on every side indicated a propitious year for their increase, and it surely has been, for from the testimony of many reliable and observant farmers we learn already of their damaging numbers in the corn crib.

"It is not my purpose in this article to enter into a detailed account of every insect attacking corn, or of every method which has been suggested to protect *grain*, but rather to reach in the fewest words the most practical results. In order to do this, I have been able to illustrate this article by inserting cuts which have been kindly loaned us by Prof. H. E. Weed, of the Mississippi Experiment Station.

"From my observations throughout the State the two worst insect enemies to stored grain are the Angumois moth and the regularly known "*Corn weevil.*"

"THE ANGOUMOIS MOTH (*Gelechia cerealella*) has been known in damaging numbers for many years. Its attack in the caterpillar (larval) condition has been seriously felt in this State in stored bran (a complete web being formed over the surface), in corn and in all grains. Garden seeds of all kind have also suffered.

"This moth is well figured at Fig. 3, A, c, and needs no technical description; in fact, such would be out of place in a discussion of this kind. Popularly described we may say the moth is not large (size indicated by the cross lines immediately below c of Fig. 3). and when seen around the grain bins the distance of flight is short. The general color of the moth is buff, especially the anterior half, the posterior being lighter, the whole insect possessing a decidedly lustre appearance which is especially noticeable upon the fingers after a moth is pressed between them.

"The question of the life history of this pest is important, as the shortness of the developing circle (from egg to moth) ought to make us feel a deeper interest in the adoption of means to stop the destruction caused by this pest. In the study of this insect during the past year we have found the developing cycle very short. Eggs deposited on April 12 hatched April 20, and on May 19 these caterpillars (worms) entered the pupa condition, and on May 31 they emerged as moths. A second brood appeared in three days less time, so that we may be safe in saying that a brood appears between every forty five and fifty days. This will apply to the entire year throughout the State, as it has been found active in its attack at all seasons. At Fig. 4 is repre-

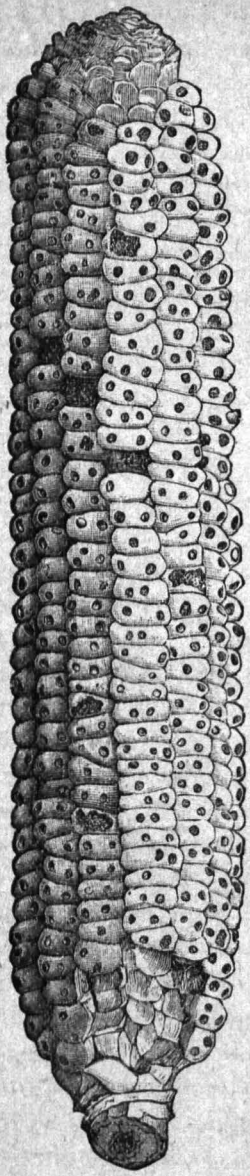

Fig. 4.

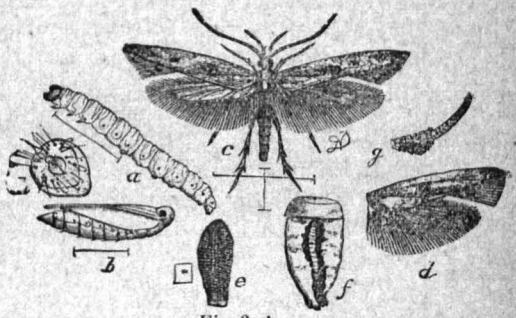

Fig. 3, A.

Fig. 3. A. Angoumois moth. a, larva; b, pupa; c, moth with outspread wings; d, wing of the paler variety; e, egg; f, corn showing damage done by larva; g, labial palpus of male moth; h, anal segment of pupa. All enlarged except f.

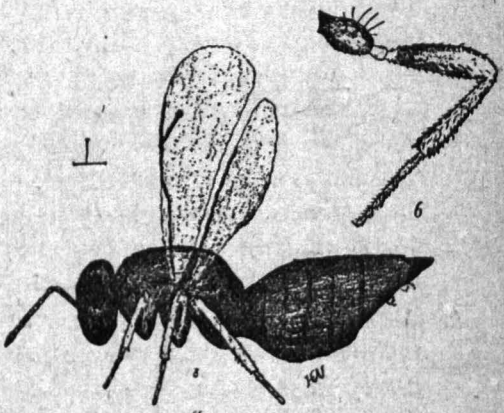

FIG. 3.

sented an ear of corn indicating the work done by this insect in the larval condition.

"The caterpillar of the Angoumois moth is attacked by chalcid parasite (see Fig. 3, B), which has done a great deal to lessen the numbers of this insect.

"CORN WEEVIL, BLACK WEEVIL (*Calandra oryzæ.*) See Fig. 5. This pest needs no description here, however, it is often confounded with the *Grain weevil* which does not possess the characteristic spots of red on the wing covers found on our common species. Early in June of the past season weevils began ovipositing in the ears of corn in the field so that by September and October, when the corn was placed in its winter quarters, the numbers of these beetles were much increased by the field broods and already damage was apparent. In the bin or crib this insect deposits its eggs within a puncture in the grain made by its beak or snout. The entire changes go on within the kernel, the adults emerging in about a month after the deposition of the eggs. Of course, as with most insect life, temperature has a marked influence on the rapidity of development, yet the usual protection of the corn crib in Louisiana offers propitious conditions for continuous increase.

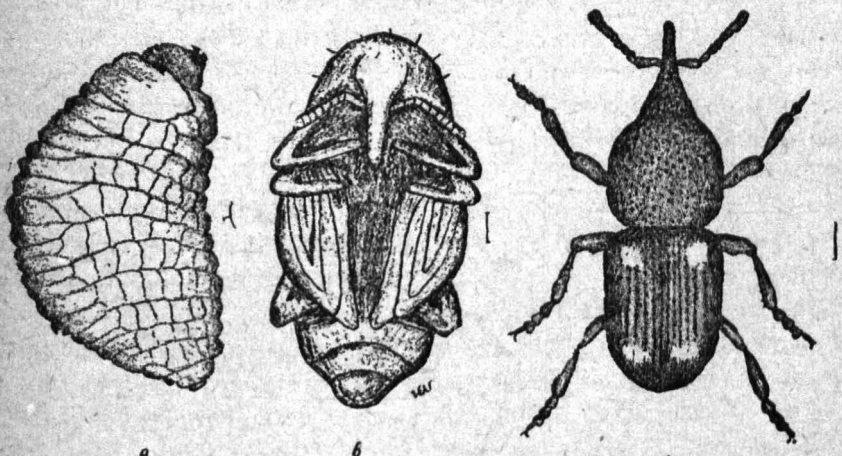

Fig. 5.

Corn weevil, Fig 5. a, grub; b, pupa (ventral aspect); c, adult weevil.

"REMEDIES.—The destruction of grain insects, rats and mice, may be accomplished by the application of bi-sulphide of carbon to the grain.

"Make your corn crib comparatively tight, with lumber or tar paper, shuck the corn and apply the material. Bi sulphide of carbon vaporizes very quickly and the gas which is much heavier than air sinks, diffusing itself to every part of the crib.

"Experiments with this gas carried on during October of this year prove conclusively of its efficiency. In these experiments we sought to get further information regarding the methods of applying the gas and to learn more of its effect upon insect life protected by the shuck. With circumstances similar to those upon the average farm the results after several trials were in favor of a distribution of the liquid (1½ pounds to every ton of grain) on the top of the bin, directly to the corn, and if much space remain above the corn a covering of sacks or other material placed on immediately after the application, is beneficial. With the shuck remaining on the ear double the quantity of this material did not give as good results as a single application without the shuck, so that we would unhesitatingly advise the removal of the shuck before treatment. This gas has not been found to kill the eggs, and hence applications about once every six weeks will be required to keep grain free from insects. The action of bi sulphide of carbon upon mice and rats is very striking, not only killing those already infesting the corn but will keep away all others.

"A very necessary precaution to take when using this gas is to keep all fire away from the building in which you are treating the grain, as the gas is inflammable and explosions will take place on the presence of fire of any kind.

"The planter should select a good producing variety of corn, the shuck of which forms tightly and well over the top of the ear. Such corn is the last attacked; this, however, is not exempt in the absence of other varieties."

Some have reported the use of bi-sulphide of carbon a failure, but this was evidently due to the use of an inferior grade, to having the crib too open or to using it in insufficient

regia) near Los Angeles, Cal. It has also been found upon the pear, cherry and locust. We have found it in Louisiana upon the peach, plum and pear, more abundantly upon the peach and Japan plum.

The attention of nurserymen is particularly called to this enemy of our fruit trees since it is almost certain to have reached this locality through the nursery.

Prof. Comstock describes this species as follows:

"*Scale of Female.*—The scale is circular flat, with the exuviæ [moults] laterad of the centre; it is of a pale grayish brown color; the exuviæ are covered with secretion; the position of the first skin is indicated by a prominence which is pink or reddish brown. The ventral scale is a mere film which adheres to the bark. Diameter 3 m. m. (.13 inch).

"*Scale of male.*—The scale of the male resembles that of the female in color; it is elongated, with the larval skin [moult] near the anterior end; this skin is covered by excretion, but its position is marked by a rose-colored prominence, as in the scale of the female; the anterior part of the scale is much more convex than the posterior prolongation, which is flattened. There is a rudimentary ventral scale in the form of two longitudinal plates, one on each side of the lower surface of the scale. Length 1.25 m. m. (.05 inch)."

The full grown female is easily separated from the scale, and is of a decided orange color.

Treatment.—Owing to the manner in which these insects congregate together, even piled upon one another, and I wish to lay particular stress upon this, a single application of an emulsion will by no means destroy all; several applications will be needed. When present upon the trunk and larger branches, which is usually the case, the emulsion of rosin should be applied with a stiff brush.

ROSE SCALE (*Diaspis rosæ*).—This scale pest is widely distributed, but has proven itself very destructive in many parts of the State during the last two years. I have received specimens, and letters asking what this pest was and what was to be done, as it had taken complete possession of the plants, debilitating

them to such an extent as to make them an easy prey to diseases. Plants thus attacked formed but few sickly flowers and dropped their leaves, and even the shoots died early in the season.

This insect may be easily recognized upon the dark and impoverished branches from its mealy appearance. The large, circular, light colored scales are those of the females, while the small, elongated, ridged (three) white specks are those of the males.

Treatment.—The scale protecting the insect is comparatively thin, and thus the effect of emulsions is more pronounced than upon many other geenra. The young make their appearance about the last of March, at which time the bushes and vines should receive a thorough spraying with either the Rosin or Kerosene emulsion. A second application should be made about the 1st of June, and a third in winter after the plants have been trimmed, this time using the strong Rosin emulsion.

The varieties of roses are very generally exchanged without any attention being paid to the danger of distributing this foe. Before putting out small plants which have been taken from an infected garden or nursery, thoroughly wash them in a strong Rosin or Kerosene emulsion.

Blackberries and raspberries have also been found attacked by the rose Scale.

CAMELIA JAPONICA SCALE (*Fiorinia fiorinæ var camelliæ*).—It is to be regretted that an enemy of this very popular plant —Camelia japonica—has already made its appearance in many parts of Louisiana.

Prof. Comstock first described this coccid (Report of Department of Agriculture, 1880). He found it a troublesome pest of the camelia in the conservatories of the department. It is also reported as infesting palms (Kentia balmoriana and Cycas revoluta).

This insect may be easily recognized by its characteristic attack upon the underside of the leaves, where it presents a mealy or floury appearance.

TREATMENT.—From the fact that it infests the under surface of the leaves, and that the Japonica is an evergreen with close branches thickly leaved, it is not an easy matter to eradicate this insect or even keep it in check, hence do not introduce it into your garden on new varieties. In spraying the plants with the Rosin emulsion lean the branches so that the spray will reach the under surfaces of the leaves. This insect spreads rapidly and should be thoroughly treated as soon as noticed. When the plants are so infested that every leaf is attacked, a strong Rosin emulsion should be used, thus cutting off all sickly and etiolated leaves, which should be immediately swept up and burnt.

THE ROUND WHITE SCALE (*Aspidiotus nerii*).—In the Special Bulletin upon the Orange mention was made of the appearance of this insect upon the "China tree." While this "China tree" scale possesses the characters of the true nerii, yet there is a slight variation in the color. This year the true type was found abundantly upon Italian lemons, which were being sold in New Orleans and other places. They were alive and in a perfectly healthy condition. Attention is here called to the danger of introducing this true type into the orange groves of the State by the purchasing of these infested lemons and bringing them among the groves. Instances have already occurred where the Purple scale (Mytilaspis citricola) has been disseminated in just this way.

THE GREEDY SCALE (*Aspidiotus rapax*).—This is a common and destructive species upon many of the fruit trees of California. I have found it this year in abundance in many places in Louisiana upon the Japan spindle tree (Euonymus japonica). As the spindle tree is a common plant in this State it may be the means of distributing this insect into the fruit orchards, and hence we would ask those who possess this species of Euonymus to make an inspection of their plants, and if infested with this scale to treat them at once.

The scale covering the female is circular and very convex, appearing as a miniature pyramid, is of a grayish brown color and is easily separated from the insect below, the body of which is bright yellow. Diameter of female scale .06 inches.

The treatment is similar to that of other species.

SWEET POTATO BORER (*Cylas formicarius*).—For some time this borer has done considerable damage in that portion of the State south of New Orleans. It is supposed to have been imported from Cuba many years ago. From the extreme gulf coast, where it first commenced its ravages, it has gradually pushed its way up the river, until now it is found above New Orleans.

In the Report of the Department of Agriculture of 1879, Prof. Comstock writes that he received specimens of this insect from Florida in 1878, where it was reported to have done much damage. In March, 1890, the Bureau of Agriculture of this State received from W. S. Reddick, of Buras, La., specimens of potatoes infested with this insect, with a letter stating that, "around Buras the Sweet potato crop had been ruined."

While making some investigation in connection with orange insects last year an opportunity was afforded of studying, to a limited extent only, the habits of this borer, which may be briefly summed up as follows: In the field the beetle deposits her eggs in the vine near or at the surface of the ground. ("The yellowish white oval eggs are laid in small cavities eaten by the parent beetles near the stem end of the tuberous roots," Comstock, Report of Department of Agriculture, 1879, page 249). I did not succeed in finding the eggs in the vine, although the work of the young grubs could be easily traced from these points, as well as from the main vine immediately above the surface of the ground. The larvæ tunnel their way down the stems into the tubers (swollen roots) where their burrows are continued until the full grown larval stage is reached, when they, in an enlarged portion of their tunnel, assume the pupa condition. In a short time the adult stage is reached and another cycle is commenced. Late in the evening and early in the morning the beetles may be found upon the vines, but at no time have I ever observed them flying about. It has been stated (Department of Agriculture, Australia, Report I, Tyron) that they do not possess wings, but this is a mistake, for our forms at least, as beneath the wing covers well developed wings may be found. From the fact, however, that their distri-

bution is not rapid, it may be assumed that little use is made of these organs. It is important to note that eggs are deposited in the tubers as well as in the vines, for beetles confined in the breeding cage with tubers, deposited their eggs singly and as many as three in a place; hence their work of destruction may go on after the potatoes have been gathered and banked, as well as in the field.

Our breeding cage records show that the insect requires thirty-five days to complete its entire transformations, and that beetles in confinement deposited eggs six days after emerging from the pupa. ("In our breeding jars these underwent their entire transformations from egg to imago in about thirty-one days of which eight days were passed in the pupa state." Comstock, Report of Department of Agriculture, April, 1879.) With us the insect remains in the pupa condition fourteen days, but this was in March. Prof. Comstock reports his in May, which may account for the difference. We bred thirty beetles from two tubers.

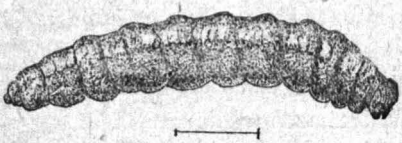

Fig. 6, a.

Fig. 6, b.

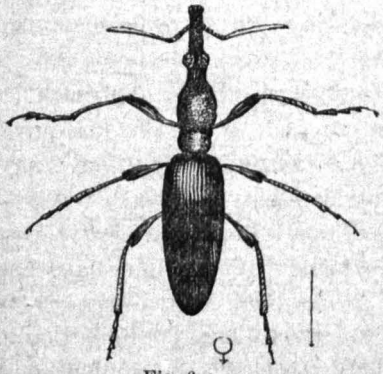

Fig. 6, c.

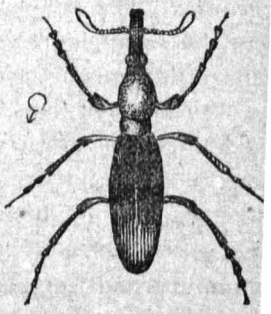

Fig. 6, d.

Sweet potato borer.—Fig. 6, a, grub; b, pupa (dorsal aspect); c, adult female; d, adult male.

The adult beetle, as shown at Fig. 6, c, female, d, male, possesses a long snout or rostrum upon which are located the eyes and antennæ. The prothorax (which is divided into two unequal parts), the antennæ, the legs, except the extreme tips, which are black, and the central portion of the mesothorax are a reddish brown. The head, wing covers and abdomen are a bluish black. The whole insect is of an elongated globular shape and may be easily recognized from the figures of the adult.

For description of the early stages I quote the following from Report of Department of Agriculture, 1879, pp. 250:

The eggs are broadly oval and somewhat narrowed at the attacked end; their greatest diameter is about .65mm (1-40 inch); surface is not polished, but shows slight granulation, and a faint appearance of division into facets. In color they are yellowish white.

The full-grown larva is 6mm (.23 inch) long, quite stout, with the lateral edges somewhat mammillated. The general color is pure white, but the head is light brown, and the mouth parts dark brown. No hairs are perceptible to the naked eye, but a few delicate sparse bristles can be seen under the microscope. Each of the thoracic segments is furnished ventrally with a large broad tubercle, in place of a pair of legs; the abdominal segments are smooth.

The pupa is at first of the same color as the larva, but gradually grows darker. It resembles much in form the adult beetle. The legs are drawn up in such a way that the knees extend out behind the thorax, those of the first pair being particularly prominent. The wings and wing cases are narrow and short, and are brought around to the ventral side of the body. The beak is folded down upon the breast. The anal segment is furnished with two backward and outward curved horn-like projections. On the top of the head are several small tubercles from each of which pr jects a slender hair.

Many of the full grown larvæ reared from the tubers in the breeding cases here were nearly one-half inch long.

Treatment.—Now that a greater interest is being excited in the growing of the different varieties of sweet potatoes, great care should be taken in the dissemination of vines and tubers from infected districts. In fact, plants or tubers should not be sent out from such localities.

If this insect is to be eliminated from the State and the Sweet potato industry to be protected, the custom of allowing small potatoes to lie in the ground and the plant vines to be taken from volunteer shoots from these potatoes, must be stopped, and every vestige of tuber and vine taken from the infested ground carefully treated. The large tubers may be fumigated in closed boxes with carbon bi-sulphide, while the small tubers may be fed to the hogs or destroyed by fire with the *vines*.

from field to field. Contagious diseases have been found to destroy these insects in large numbers. Through the kindness of Prof. Snow, of the Experiment Station of Kansas, we are in possession of a few diseased bugs, so that should an outbreak of the Chinch-bug occur in any part of the State we shall only be too willing to set on foot the spread of this disease among the Chinch bugs. See cut of diseased bug at Fig. 8.

Fig. 8.

Should the occasion present itself for the opportunity of the study of this pest in Louisiana, a more detailed article will appear on this enemy at a future date.

FRUIT TREE BORERS—THE PEACH BORER *Sannina (Ægeria) exitiosa*—is more or less familiar in name and amount of damage done, if not in habit. It is without doubt the greatest enemy that the peach has had in this State up to the present time.

The adult insect is a moth, the wings of which are clear (more especially in the male), and differs from most of other moths in that it flies by day. It often escapes notice by its similarity to wasps and wasp-like insects.

The eggs are deposited upon the trunk at or near the surface of the ground. The borers upon hatching penetrate the outer

bark and live upon the sap wood, usually pushing their way down towards the roots, where, beneath the surface of the ground, they live in the larval condition for nearly a year. All the specimens taken during the winter from the trees have been in the borer stage. Early in the spring it is not uncommon to find the pupa in an enlarged portion of the channel. While we have not yet succeeded in breeding this insect from the egg to the adult, yet from the portions of its life history, gotten as it has been by piece-meal, we are led to the belief that in this State but one brood a season exists.

Treatment.—From the sawdust-like borings seen upon the ground, and from the gummy exudations from the tree, one may easily learn of the presence of this insect. The attack is often made below the ground and it is here that the most damage is liable to be done.

Among the remedial measures adopted after trees have become attacked, the most important one is to make a careful search for the borers and with a knife dig them out.

Applications of substances to the trees are of some value when the larvæ have not made much headway. The most important are :

1. Glubo, which is a soap refuse gotten from Keller's Soap Factory in New Orleans. This is applied, after being diluted with water to about the consistency of paint, with a brush to the trunk and larger branches of the trees. Remove the dirt from around the base of the trunk down to the roots, and apply well to these parts.

2. White wash, through which has been mixed Paris Green in the proportions of one tablespoonful of Paris Green to every ten quarts of white wash, this destroys the young borers.

3. Wood ashes is sometimes buried around the base of the tree ; this is only of service to the parts to which applied.

Preventing the moth from depositing her eggs is often accomplished by mounding earth and ashes around the base of the tree. Fine wire screening, folded around the trunk a few inches below the ground and about one foot above, makes a very convenient protector. The principle is protection, so that any

cheap material answering this purpose may be applied. A cloth wrapped around the base of the tree and afterwards smeared over with crude gas tar will be found an excellent repellant, but will have to be loosened from time to time to permit of growth.

THE FIG BORER (Not yet determined).—In the Horticultural Report of last year, made from this Station, attention was called to the prevalence of this insect around New Orleans, La.

The adult of this borer is a long horned beetle. Specimens of the larva and adult have been found. The growth of the grub is slow, probably taking two or three years to complete this stage.

As the attack is usually made upon the tree where the bark has become abraded, the greatest care should be taken in the picking of the fruit, not to allow parties wearing heavy footwear to ascend the tree. As little pruning and cutting of the branches should be indulged in as possible, and by all means, vigorous varieties of figs should be secured, and these kept in a healthy condition. Attack is usually made at those parts where decay of some stage is present.

The remedial and preventive measures adopted for the peach borer are applicable in many cases to the fig borer.

CATTLE TICK—*Boophilus* (*Ixodes*) *bovis*.—Mention is made of this pest in order to call attention to the efficiency of the fish oil emulsion as a repellant of it. During our experiments with this and other substances in connection with the Horn fly it was found that the stock were soon relieved of the ticks. Applications were continued and no ticks could be found upon the stock during the season. A young animal, badly infested with ticks, was confined to a yard and smeared over with undilute fish oil. Inside of forty-eight hours the animal was relieved of nearly all the ticks. Experiments are now being conducted upon Northern (north of the tick line) cattle, which have been brought to this Station, with the idea of ascertaining if they can be kept free from ticks and hence of the "Texas fever."

A CORRECTION.

In the report from this department last year there appeared a note upon a new species of Trissolcus, which I had found preying upon the eggs of the Murgantia histrionica. Dr. Ashmead named this species T. murgantiæ, but unfortunately I was away at the time the report was being printed and unable to correct the proof, and the name appeared morgantiæ.

The thanks of this Department is tendered Dr. Riley of the Department of Agriculture, Washington, D. C.; Prof. Cockerell, Agriculture College, New Mexico, for the identification of specimens and other kindnesses; to Prof. Weed, Mississippi Agricultural College, for the loan of many plates; and to the many others who have kindly aided the work of the past year.

Respectfully submitted,

H. A. MORGAN, Entomologist.

METEOROLOGICAL REPORT FOR YEARS 1892 AND 1893.

Month.	1892.				1893.			
	Highest maximum.	Lowest minimum.	Mean.	Rainfall in inches.	Highest maximum.	Lowest minimum.	Mean.	Rainfall in inches.
January	72	22	44.2	6.93	75	25	47.6	2.34
February	77	36	56.7	1.33	78	34	58.	1.78
March	79	25	55	6.18	82	30	58.7	5.65
April	84	39	68	9.85	86	48	70.4	1.99
May	92	50	73.6	2.76	89	54	73.9	10.66
June	93	53	78.4	8.63	92	66	78.5	6.84
July	90	70	79.3	7.92	93	68	81.	2.87
August	90	68	79.6	7.39	91	64	78.8	4.84
September	89	57	74.3	1.55	90	62	76.6	7.03
October	85	36	68.6	.68	84	41	64.2	1.38
November	80	32	59.8	4.84	79	32	55.6	6.99
	77	19	52.1	5.18	84	27	53.8	3.77

Observations made at the State Experiment Station, Baton Rouge, La.